

## CLAIMS

We claim:

- 1 1. A method for modifying at least one electrical characteristic of a horn antenna,  
2 comprising the steps of:
  - 3       configuring said horn antenna in a first operating mode in which said horn
  - 4       antenna has at least a first electrical characteristic; and
  - 5       selectively changing at least one of a volume and a location of a conductive fluid
  - 6       contained within said horn antenna to produce at least a second operating mode in
  - 7       which said horn antenna has at least a second electrical characteristic different from said
  - 8       first electrical characteristic.
- 1 2. The method according to claim 1 wherein said selectively changing step further  
2       comprises selectively varying a profile of at least one conductive inner surface of said  
3       horn antenna.
- 1 3. The method according to claim 1 wherein said selectively changing step further  
2       comprises selectively varying a position of at least one conductive surface of said horn  
3       antenna.
- 1 4. The method according to claim 1 wherein said selectively changing step further  
2       comprises changing a flare angle of said horn antenna.

1 5. The method according to claim 1 wherein said selectively changing step further  
2 comprises changing at least one internal dimension of a throat region of said horn  
3 antenna.

1 6. The method according to claim 1 wherein said selectively changing step further  
2 comprises changing at least a corrugation geometry of said horn antenna.

1 7. The method according to claim 1 wherein said selectively changing step further  
2 comprises changing at least an aperture diameter of said horn antenna.

1 8. The method according to claim 1 wherein said electrical characteristic is selected  
2 from the group consisting of an input impedance, a radiation pattern, a gain, and an  
3 antenna beamwidth.

1 9. The method according to claim 1 wherein said selectively changing step further  
2 comprises controlling at least one of a valve, a pump and a fluid actuator.

1 10. An electromagnetic horn antenna comprising:  
2 a horn housing having a throat portion, a tapered portion and an aperture;  
3 at least one cavity structure defined within said horn housing, said cavity  
4 structure comprising at least one portion formed of a dielectric material;  
5 a conductive fluid and a fluid control system, said fluid control system selectively  
6 controlling at least one of a volume and a position of said conductive fluid contained

7 within said at least one cavity structure for dynamically modifying at least one electrical  
8 characteristic of said electromagnetic horn antenna.

1 11. The electromagnetic horn antenna according to claim 10 wherein an interior  
2 surface of said housing is corrugated so as to define a series of ribs axially spaced along  
3 a length of said horn housing and defining a plurality of slots.

1 12. The electromagnetic horn antenna according to claim 10 wherein said at least  
2 one cavity structure is at least partially comprised of said ribs.

1 13. The electromagnetic horn antenna according to claim 12 wherein at least one of  
2 said plurality of ribs is formed of a conductive material.

1 14. The electromagnetic horn antenna according to claim 12 wherein at least one of  
2 said plurality of ribs is formed of a dielectric material.

1 15. The electromagnetic horn antenna according to claim 10 wherein said at least  
2 one portion of said cavity structure is an annular dielectric wall extending between  
3 adjacent ones of said ribs.

1 16. The electromagnetic horn antenna according to claim 10 wherein said at least one  
2 electrical characteristic is selected from the group consisting of an input impedance, a  
3 radiation pattern, a gain, and an antenna beamwidth.

1 17. The electromagnetic horn antenna according to claim 10 wherein said control  
2 system controls said volume of said conductive fluid to change a flare angle of said horn  
3 antenna.

1 18. The electromagnetic horn antenna according to claim 10 wherein said control  
2 system controls said conductive fluid to change at least one internal dimension of said  
3 horn antenna.

1 19. The electromagnetic horn antenna according to claim 10 wherein said control  
2 system controls said conductive fluid to change at least a corrugation geometry of said  
3 horn antenna.

1 20. The electromagnetic horn antenna according to claim 10 wherein said control  
2 system controls said conductive fluid to change at least an aperture diameter of said  
3 horn antenna.

1 21. The electromagnetic horn antenna according to claim 10 wherein said control  
2 system controls said conductive fluid to convert an inner conductive surface of said horn  
3 antenna from a smooth profile to a corrugated profile.